SK08-T8	Multiple PT1000	**Product Group 1**
KNX, Indoor / Outdoor, IP54/65	Document: 3100_ex_SK08-T8.pdf	Article No.

KNX Controller 8 Channel Temperature for measurement and control of up to 8 temperatures.
The temperatures are measured with the external PT1000 temperature probes.
Different kind of probes can be mixed in one installation.

For indoor / outdoor / damp room application, IP54

Use case:
Monitoring and control of temperatures in heating- / cooling- or informational applications.
The temperature probes (PT1000) are not included in delivery.

The additional PT1000 Sensors for surface mounting, screwing in or contacting with customized cable-length can be ordered.
(see rubric Z, Components / Replacement Parts)

	SK08-T8	KNX Controller 8 Channel temperature for measuring and controlling up to 8 temperatures. Operating temperature: -20 .. +80°C Measured temperature range: -50 .. +200°C Plastic housing: (115 x 65 x 55) mm For indoor / outdoor and damp room IP54/65 Without temperature probes	30801000

Arcus-EDS GmbH
www.arcus-eds.de

Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de

Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

1.1 Application Description

Operating Principals and Areas of Application

The production series S8 uses sensors and controllers for a number of physical and chemical measurements for indoor and outdoor areas.

The measurement system SK08-T8 registers the temperatures on 8 measuring points, which are measured with a PT1000. As the temperature changes, the measurement sensors change their resistance. The change of resistance will be digitalized and output to a KNX bus. All commercially available temperature sensors can be used, provided that they are PT1000 types.

The temperature sensors of the SK08-T8 are connected in series. Therefore, any unused input must be short-circuited with the DIP switch. The channel is short-circuited and deactivated when the associated DIP switch is set to "ON" or "1".
After changing the configuration, the KNX bus must be disconnected for a few seconds.

A number of controller models with various functions are available.

KNX sensors are set up using the ETS (Tool Software) with the associated application program.
The device is delivered unprogrammed.
All functions are parameterized and programmed by ETS.
The controller can be switched on or off by activation or locking via the KNX bus.

Functions

8x Temperature measurements with the following

- Two position controller with switch and pulse 1-bit output
  or
- PI controller with continuous 8-bit or pulse-width modulated 1-bit output
- Measured Value can be periodically displayed or when value changes
- Adjustable periodic display of control variable (parameterized)
- Adjustable release and lock with all controllers (parameterized)
- Threshold alarm for upper and lower thresholds
- Auxiliary quantity of set value or threshold via the bus
- Calibration of the sensor (offset cancellation)

1.2 KNX Parameter

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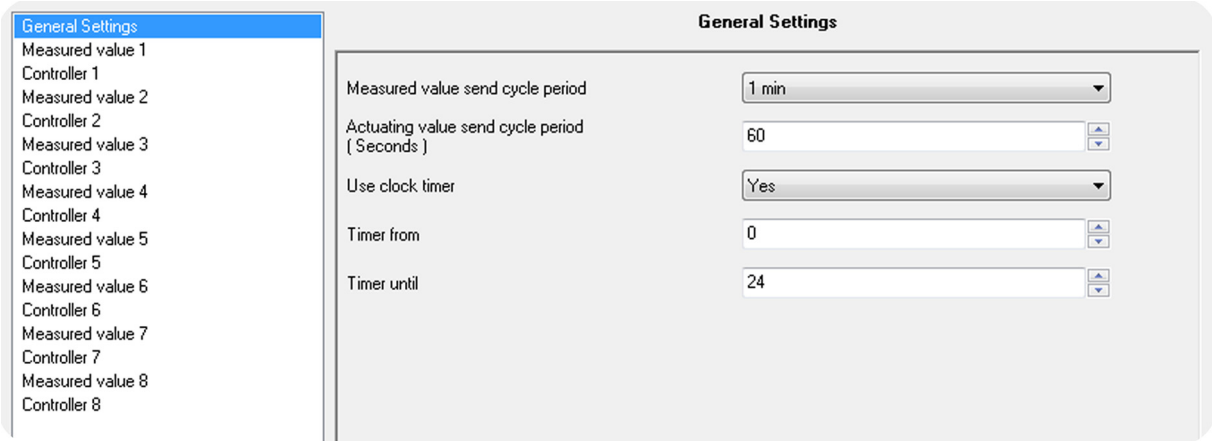
www.arcus-eds.de sales@arcus-eds.de Fax.: +49 / (0)30 / 2593 3915

1.2.1 General Settings



General Settings - SK08-T8

Parameter	Setting	Description
Measured value send cycle period	1 .. 120 minutes	The transmission period of the measurement values that are to be sent cyclically. In the parameter set “Measured value x“ you can determine if the measurement values are sent periodically.
Actuating value send cycle period (Seconds)	10 .. 250	The transmission period of the correcting variables of the controller that are to be sent cyclically. In the parameter set “Controller x“ you can determine if the measurement values are sent periodically.
Use clock timer	• No • Yes	When the timer is used, two additional parameters (timer from / to) and the objects 58 „device time“ and 59 „device date“ are available.
Timer from Timer until	0 .. 24 hour	The controller output can be locked depending on the time of day. The time in which the controller is unlocked must be entered here. In the parameter set „Controller x“ you can determine if the timer function is to be used for a specified controller.

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www.arcus-eds.de
Rigaer Str. 88 , 10247 Berlin
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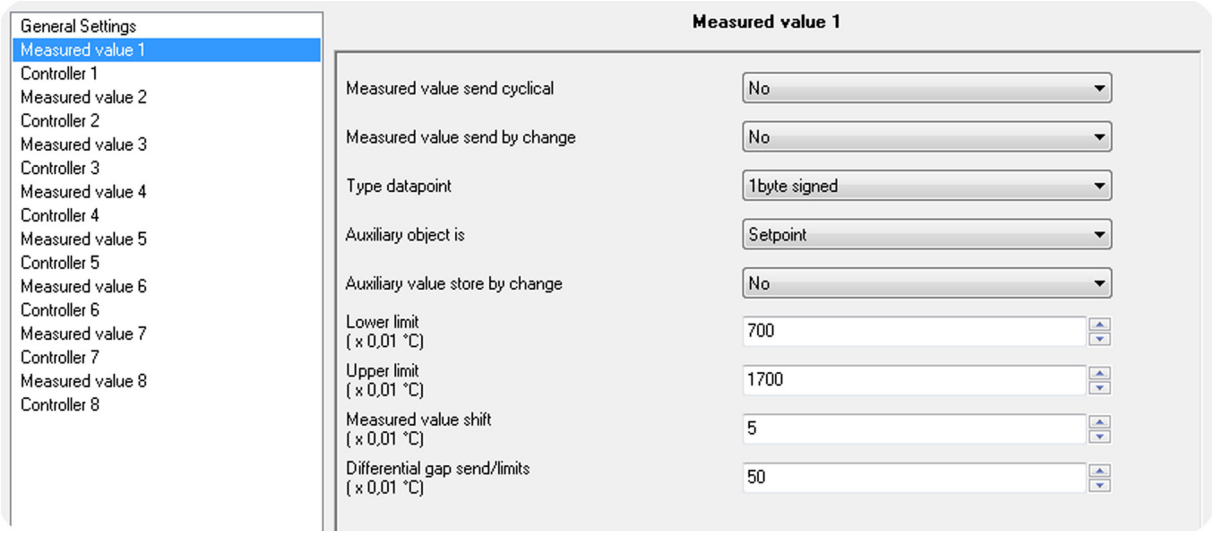
1.2.2 Measured Value 1 .. 8



Measured Value 1 .. 8 - SK08-T8

Parameter	Setting	Description
Measured value send cyclical	• No • Yes	The transmission period can be parameterized in the parameter set „General Settings“.
Measured value send by change	• No • Yes	The necessary change can be set in the parameter „Differential gab send / limits“
Type datapoint	• 1-Byte signed • 2-Byte signed • 2-Byte float • 4-Byte float	Measured Data Output and Auxiliary Data are defined concurrently.
Auxiliary object is	• Setpoint • Upper limit • Lower limit	Every controller has an auxiliary object which can control either the set point of the controller or the limit values.
Auxiliary value store by change	• No • Yes	When the auxiliary data is changed the new value is carried over to EEPROM and saved in case of a bus voltage breakdown. This should be used only when the data is not frequently changed as EEPROM has only a limited memory cycle.
Lower limit (x 0,01 °C)	-9999 .. +19999	If the measured value corresponds with the preset value, the object 5 / 12 / 19 / 26 / 33 / 40 / 47 / 54 „Output, Lower Limit Kx“ will be set. (Please mind the factor !)
Upper limit (x 0,01 °C)	-9999 .. +19999	If the measured value corresponds with the preset value, the object 4 / 11 / 18 / 25 / 32 / 39 / 46 / 53 „Output, Upper Limit Kx“ will be set. (Please mind the factor !)

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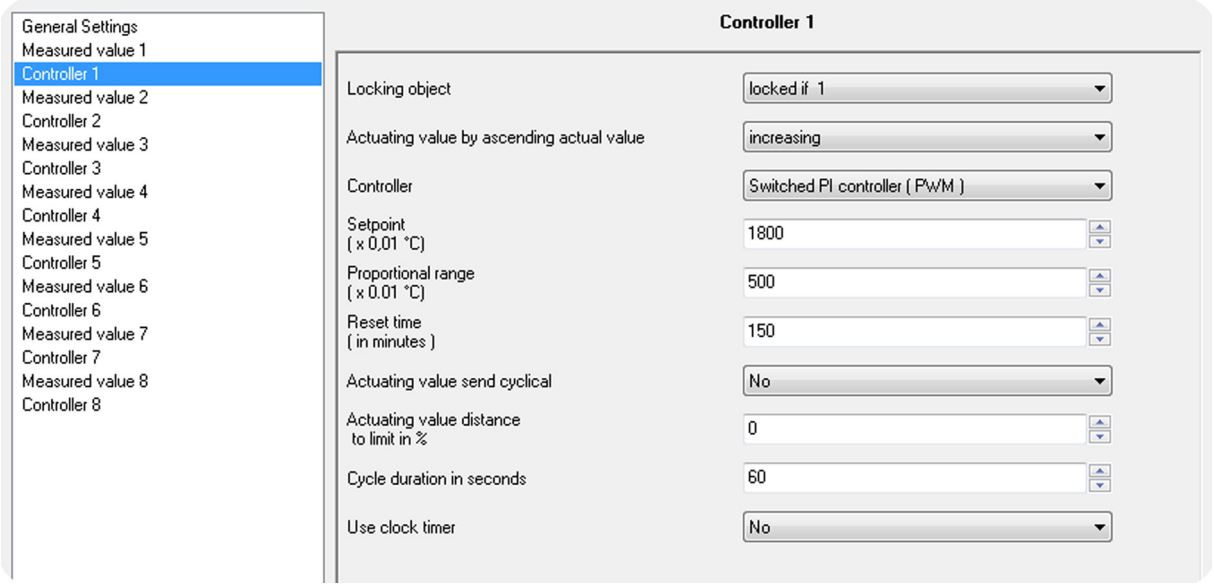
www.arcus-eds.de
Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de
Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

Measured Value 1 .. 8 - SK08-T8 (continue)

Parameter	Setting	Description
Measured value shift (x 0,01 °C)	-32768 .. +32767	A calibration / offset adjustment of the sensors can occur when the measured displacement is offset due to cable length or other known external influences. (Please mind the factor !)
Differential gab send / limits (x 0,01 °C)	-9999 .. +19999	To reduce the bus load when a value is changed and to avoid multiple switching between measured data and thresholds, a hysteresis between 0,1°C and 1°C should be used. (Please mind the factor !)

1.2.3 Controller 1 .. 8



Controller 1 .. 8 - SK08-T8

Parameter	Setting	Description
Locking object	• locked if 1 • locked if 0	When using the Locking object 7 / 14 / 21 / 28 / 35 / 42 / 49 / 56 „Input, enable / lock Cx“ the controller output is deactivated. The lock function can be set up for „release“ or „lock“.
Actuating value by ascending actual value	• increasing • decreasing	The actuating direction of the controller can be adapted to the characteristics of the controlled system.

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www.arcus-eds.de
Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de
Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

Controller 1 .. 8 - SK08-T8 (continue)

Parameter	Setting	Description
Controller	• Steady PI Controller • Switched PI Controller (PWM) • Two-Position Controller • Two-Position Controller Pulsed	The different controller types and the corresponding parameters are described in chapter *1.4 Notes*
Setpoint (x 0,01 °C)	-9999 .. +19999	Setpoint setting (Please mind the factor !)
Proportional range (x 0,01 °C)	-9999 .. +19999	see chapter *1.4 Notes* - General Rules for Adjusting the PI Parameter (Please mind the factor !)
Reset time (in minutes)	0 .. 255	see chapter *1.4 Notes* - General Rules for Adjusting the PI Parameter
Actuating value send cyclical	• No • Yes	The cycle period is set in „General Settings“.
Actuating value distance to limit in %	0 .. 50	When the lower threshold is surpassed 0% is set, when the upper threshold is surpassed 100% will be set. This is important for actuators which do not operate reliably at threshold levels
Cycle duration in seconds	0 .. 65535	Total time of On and Off state
Differential gab Cotroller (x 0,01 °C)	-9999 .. +19999	see chapter *1.4 Notes* - Two-Positon Control (Please mind the factor !)
Duty cycle in %	0 .. 50	duty cycle = pulse duration / cycle duration x 100 see chapter *1.4 Notes* - Two-Positon Control with Pulsed Output
Use clock timer	• No • Yes	The use of the clock timer can be enable / disable for each channel separately.

Arcus-EDS GmbH
www.arcus-eds.de

Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de

Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

1.3 KNX Objects

Objects - SK08-T8

No.	Label	Data Point Type	Function
0	Output, sensor status shorted	DPT 4 Byte	Output status
1	Output, sensor status break	DPT 4 Byte	Output status
2 9 16 23 30 37 44 51	Output, measured value C1 .. C2 .. C3 .. C4 .. C5 .. C6 .. C7 .. C8	DPT adjustable	Measured value
3 9 16 23 30 37 44 51	Input, auxiliary C1 .. C2 .. C3 .. C4 .. C5 .. C6 .. C7 .. C8	DPT adjustable	Auxiliary object
4 9 16 23 30 37 44 51	Output, upper limit C1 .. C2 .. C3 .. C4 .. C5 .. C6 .. C7 .. C8	DPT 1.002 Bool 1 Bit	Limit
5 9 16 23 30 37 44 51	Output, lower limit C1 .. C2 .. C3 .. C4 .. C5 .. C6 .. C7 .. C8	DPT 1.002 Bool 1 Bit	Limit
6 9 16 23 30 37 44 51	Output, controller C1 .. C2 .. C3 .. C4 .. C5 .. C6 .. C7 .. C8	DPT adjustable	Actuating value
7 9 16 23 30 37 44 51	Input, enable / lock C1 .. C2 .. C3 .. C4 .. C5 .. C6 .. C7 .. C8	DPT 1.002 Bool 1 Bit	Enable / lock

Arcus-EDS GmbH
www.arcus-eds.de
Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de
Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

Objects - SK08-T8 (continue)

No.	Label	Data Point Type	Function
8 15 22 29 36 43 50 57	Output, Object status C1 .. C2 .. C3 .. C4 .. C5 .. C6 .. C7 .. C8	DPT 1 Byte	Channel status
58	Equipment time	DPT 10.001 Time of day 3 Byte	Time
59	Equipment date	DPT 11.001 day of month 3 Byte	Date

Object Description - SK08-T8

No.	Label	Description
0 1	Output, sensor status shorted Output, sensor status break	The values of the individual bits are added and transmitted to the bus. Short circuits are tolerated and you have to short-circuit the channel if it is not used. Interruptions are not tolerated and will lead to a distortion in the measured data of the other channels. If several interruptions appear, all short circuit switches should be set and then resolved one by one until the interrupted sensor is found.

Sensor-No.	Bit-No.	Hexadecimal	Decimal
1	0	0x01	1
2	1	0x02	2
3	2	0x04	4
4	3	0x08	8
5	4	0x10	16
6	5	0x20	32
7	6	0x40	64
8	7	0x80	128

No.	Label	Description
8 15 22 29 36 43 50 57	Output, Object status C1 .. C2 .. C3 .. C4 .. C5 .. C6 .. C7 .. C8	The values of the individual bits are added and transmitted to the bus. The status functions monitor the controller status for purposes of reporting and troubleshooting

Status:	Bit-No.	Hexadecimal	Decimal
upper limit too large	0	0x01	1
lower limit underrun	1	0x02	2
setpoint not equal to zero	2	0x04	4
lock activ	3	0x08	8
auxiliary is stored	4	0x10	16
timer activ	5	0x20	32

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www.arcus-eds.de
Rigaer Str. 88 , 10247 Berlin
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Tel.: +49 / (0)30 / 2593 3914
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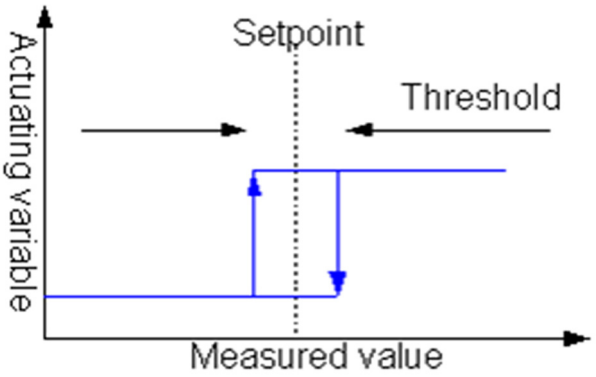
1.4 Notes

Controller models available are the PI controller or a two-position controller. Both controllers are equipped with pulsed output.
The pulsed two-position controller works with constant duty cycle, which like the cycle duration is parameterized.
The duty cycle of the pulsed PI controller is variable and depends on the control variable (pulse-width modulation).

Two-Position Control

Two-position control is a very simple way of controlling.
Once the actual value (± half the switching difference) exceeds or falls below the set point a switch-on or switch-off command is sent to the bus.
Set the differential gap large enough to keep bus load to a minimum and configure the differential gap small enough to avoid extreme actual value fluctuations.

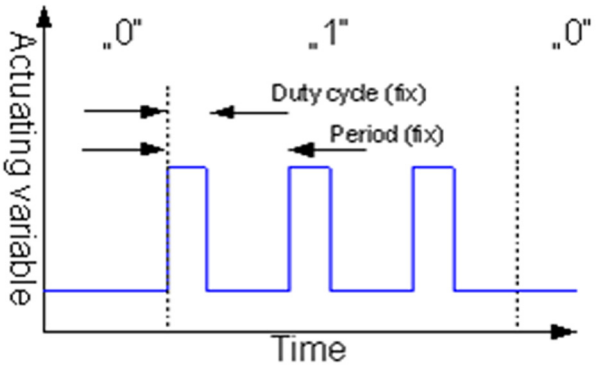
The two-position controller is parameterized using the set point and the switching threshold.



Two-Position Control with Pulsed Output

The controller works analogous to the two-position controller.
The actuating variable emits pulses with fixed duty cycle.

When the control variable reaches 40% in a cycle time of 10 minutes it will repeatedly turned on for 4 minutes and turned off for 6 minutes.



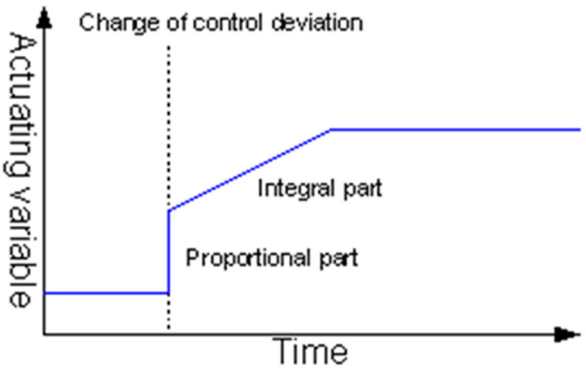
Arcus-EDS GmbH
Rigaer Str. 88 , 10247 Berlin
Tel.: +49 / (0)30 / 2593 3914
www.arcus-eds.de
sales@arcus-eds.de
Fax.: +49 / (0)30 / 2593 3915

Continuous PI Control

To understand a PI controller one should think of an algorithm consisting of a proportional and integral part.
By combining these two parts it is possible to get a quick and exact adjustment of the actuating variable.

The controller calculates the control variable every second.
It can constantly be updated and is displayed periodically (value parameterized) by the PI controller.

Through the integral part an offset is adjusted to 0 over a certain period of time.

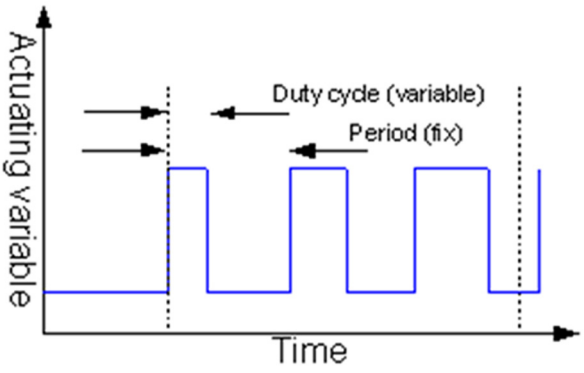


Continuous PI Control with Pulsed Output (PWM)

The controller works analogous to the PI controller, but the actuating variable emits pulses with a variable duty cycle.

PWM control sets the cycle duration of the transmission interval.
This allows a permanent on and off within the cycle time, which reaches an average valve position.

The duty cycle is determined indirectly via the integration time.



Arcus-EDS GmbH
Rigaer Str. 88 , 10247 Berlin
Tel.: +49 / (0)30 / 2593 3914
www.arcus-eds.de
sales@arcus-eds.de
Fax.: +49 / (0)30 / 2593 3915

General Rules for Adjusting the PI Parameter

The reset time must be significantly larger than the delay time of the control system.
The proportional area corresponds to the reinforcement of the control circuit.
The smaller the proportional area, the larger the reinforcement is.
.

Parameters	**Effect**
Low Proportional Area	Quick adjustment to the setpoint. Strong overshoot when setpoint is compensated (continuous oscillation possible).
High Proportional Area	Slow correction of control deviations. No or few overshoots.
Short Integration Time	Rapid correction of control deviations. Danger of continuous oscillation.
Long Integration Time	Slow correction of control deviations. Little danger of overshoots or continuous oscillation.

Arcus-EDS GmbH
www.arcus-eds.de
Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de
Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

1.5 Product Page

The KNX Sensor SK08-T8 8-Channel Temperature is a sensor / controller from the S8 series and used for measuring and controlling 8 separate temperatures which are recorded by an external PT1000 temperature sensor.

Several temperature sensors can be used and Arcus-EDS provides a multitude of accessories such as sleeve / screw-in / ceiling / and feed sensors for many diverse applications.

The device has an integrated KNX bus coupler and does not require additional voltage.

The transducer is located in a high-strength, extremely robust stable impact ABS plastic housing. Cover and base have a revolving groove and tongue system with neoprene gasket. The housing is IP54.

In the application software a separate controller (2-position or PI controller with continuous or pulsed output) is available for every channel.

Other functions include maximum and minimum thresholds and a help key where the set point and thresholds can be switched.

The sensor is configured with ETS (Tool Software) and the application program. Controlling functions such as signal threshold and diverse adjustments are set using ETS.

Article-No.: 30801000

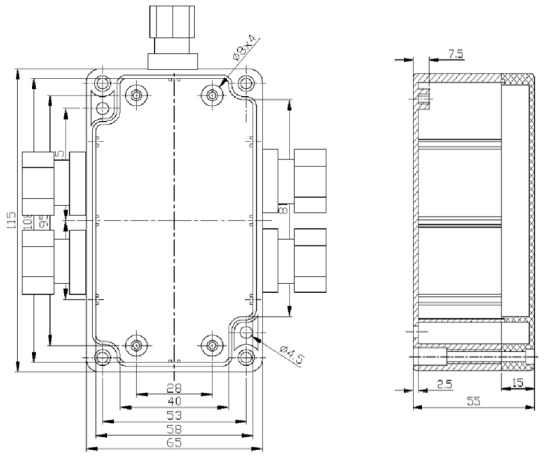
SK08-T8
8 Channel Temperature
Controller / Sensor
(PT1000 as accessory)

Areas of Application

- General surveillance and controlling of temperatures
- Surveillance and controlling of temperatures for heating and cooling and temperature logging

Applicable Sensor:	PT1000
Measuring Range:	-50 .. +200°C
Resolution:	± 0,01°C
Accuracy:	± 0,3°C + Accuracy of Sensor
Operating Voltage:	21 .. 32VDC
Power Consumption:	approx. 240mW (at 24VDC)
Operating Temperature:	-20 .. +80°C
Storage Temperature:	-20 .. +85°C
Ambient Temperature Electrodes	according to manufacturer's specifications
Protection Class:	IP54/65

Unused inputs must be short-circuited with the DIP switches inside the unit (position "ON", factory setting).



Arcus-EDS GmbH
Rigaer Str. 88 , 10247 Berlin
Tel.: +49 / (0)30 / 2593 3914
www.arcus-eds.de
sales@arcus-eds.de
Fax.: +49 / (0)30 / 2593 3915

1.6 Technical Data

Technical Data - SK08-T8

Measured Data	8x Temperature
Sending Options	no sending, cyclical sending when change occurs
Parameter	Cyclical sending with variable periods, sending when change occurs with hysteresis
Object type T1 .. T8	1-Byte signed, 2-Byte signed, 2-Byte-float, 4-Byte-float
Controller Modi	Steady PI controller Switched PI controller (PWM) Two-Position controller Two-Position controller Pulsed
Parameter Steady PI controller	Setpoint, reset time, proportional factor, controller mode
Parameter Switched PI controller (PWM)	Setpoint, reset time, proportional factor, controller, cycle duration, threshold pitch
Parameter Two-Position controller	Setpoint, differential gap, controller mode
Parameter Two-Position controller Pulsed	Setpoint, differential gap, controller mode , cycle duration, duty cycle
Lock Function	All controller parameterizable as enable or lock
Controller Variables Output	depends on Controller Modi 1-Byte unsigned, 1-Bit Switch
Setpoint value send cyclical	None or 10-250 seconds, parameterizable
Limits T1 .. T8	Lower limit, Upper limit
Auxiliary value T1 .. T8	Setpoint, Upper limit or Lower limit
Bus power failure	Saving changed auxiliary quantities, parameterizable
Measured value shift	T1 .. T8
Ambient Temperature Electronic Measuring Equipment Casing	Operation: -20 .. +80°C Storage: -20 .. +85°C
Ambient Humidity	0 .. 95% rH not condensating
Accuracy	± 0,3°C
Resolution	± 0,01°C

Arcus-EDS GmbH
www.arcus-eds.de

Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de

Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

Technical Data - SK08-T8 (continue)

Operating Voltage	KNX bus voltage 21 .. 32VDC
Power Consumption	approx. 240mW (at 24VDC)
Auxiliary Supply	not required
Bus Coupler	integrated
Start-up with ETS	**ARC_S8 Product: S8-T8**
Curcuit Points	2-pole clamps (red / black)
Protection Class	IP54/65
Assembly Type Transducer	Assembly with 2 screws finery
Casing Transducer	ABS plastic grey
Casing Dimensions	(115 x 65 x 55) mm (L x W x H)
Article Number	30801000
Probes	PT1000 any type

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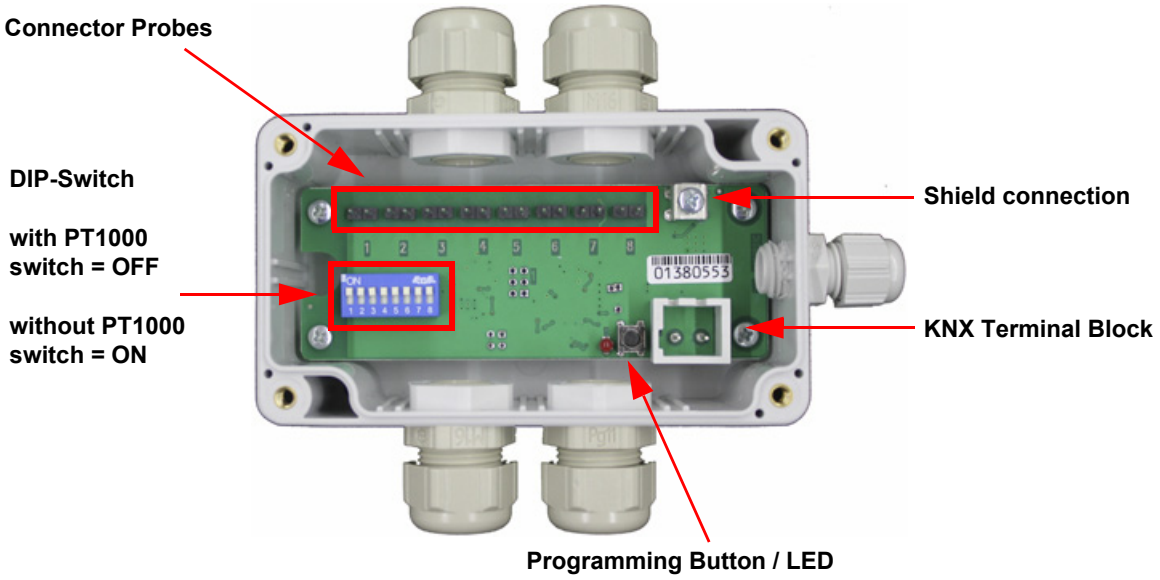
Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de
Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

1.7 Startup

The KNX Sensor is set up using the ETS (Tool Software) and the applicable application program.
The sensor is delivered unprogrammed. All functions are programmed and parameterized with ETS.
Please read the ETS instructions.



SK08-T8 Assembly View

The temperature sensors of the SK08-T8 are connected in series. Therefore, any unused input must be short-circuited with the DIP switch. The channel is short-circuited and deactivated when the associated DIP switch is set to "ON" or "1".
After changing the configuration, the KNX bus must be disconnected for a few seconds.

Channel	Number	Deactivated with	Error Code in Case of Interruption (Object 1) and Shortcut (Object 0)
1	1	always activ	0x01
2	2	switch 2	0x02
3	3	switch 3	0x04
4	4	switch 4	0x08
5	5	switch 5	0x10
6	6	switch 6	0x20
7	7	switch 7	0x40
8	8	switch 8	0x80

During start-up, should always be the „error code break“ (read object 1). Only if the error code is 0, the device can properly record the temperatures. The error codes of the various channels are added. For example, 0xA2 as an error code that the 2nd, 6th and the 8th have a channel interruption. It can happens, that a new interrupt is displayed, after the removal of a further one, which was previously not displayed. This is caused by the measuring principle witch is used. In any case, all interrupts have to be eliminated, until the error code is 0x00.

Example: There are 5 sensors used on channels 1 to 5 The switch 1 to 5 must „OFF“ or „0“,
the switch to 6, 7 and 8 „ON“ or „1“. The short-circuit fault code is now „0xE0“ or „224“,
the error interruption code must be 0x00.

Arcus-EDS GmbH
www.arcus-eds.de
Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de
Tel.: +49 / (0)30 / 2593 3914
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1.8 Assembly

The Sensor SK08-T8 is for outdoor and (moist) indoor areas. It fulfills protection class IP54/65.
The sensor is attached to the wall with two screws
The transducer lid is opened by loosening the screws.

In cases where radiations can distort the readings, shielded cables must be used. For the shielding is present on the PCB a connection option.

First attach the sensor to the wall or ceiling, then insert the KNX Bus cable into the slot on the side of the casing (PG Connection).
Detach the bus clamp from the device, attach the cable and replace the clamp onto the board.
After successfully programming the device, screw the cover back on.

In order to fulfil IP54/65 protection class the gasket ring must be carefully placed in the lid.

Be careful not to damage the electronics with tools and cable heads.

In Case of Bus Voltage Recurrence

All changes made using the help key for the KNX/EIB bus are saved if the device has been correctly parameterized.
The controller and outputs start with their current values and the ETS parameter settings are saved.

Discharge Program and Reset Sensor

In order to delete the programming (projecting) and to reset the module back to delivery status, it must be switched to zero potential (disconnect the bus coupler).
Press and hold the programming button while reconnecting the bus coupler and wait until the programming LED lights up (approx. 5-10 seconds).
Now you can release the programming button.
The module is ready for renewed projecting.
If you release the programming button too early, repeat the aforementioned procedure.

Arcus-EDS GmbH
www.arcus-eds.de
Rigaer Str. 88 , 10247 Berlin
sales@arcus-eds.de
Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915

Imprint

Editor: Arcus-EDS GmbH, Rigaer Str. 88, 10247 Berlin
Responsible for the contents: Hjalmar Hevers, Reinhard Pegelow

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Safety Regulations

Attention! Installation and mounting must be carried out by a qualified electrician.
The buyer/operator of the facility has to make sure that all relevant safety regulations, issued by VDE, TÜV and the responsible energy suppliers are respected. There is no warranty for defects and damages caused by improper use of the devices or by non-compliance with the operating manuals.

Warranty

We take over guarantees as required by law.
Please contact us if malfunctions occur. In this case, please send the device including a description of the error to the company's address named below.

Manufacturer

KNX arcus-eds electronic design services gmbh

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sales@arcus-eds.de
Tel.: +49 / (0)30 / 2593 3914
Fax.: +49 / (0)30 / 2593 3915